Cast Steel Shot and Grit

2003045

The Miracle Workers of Blast Cleaning, Profiling, Peening

Part 5 of 5 part series

Technical Bulletin June, 1996 ▪ Reprinted with permission from Ervin Industries

In the previous chapters of this series, we have discussed how the #1 priority, QUALITY OF PRODUCT FINISH (contaminant removal and anchor-pattern profile), is affected by the user's choice of these four cast steel abrasive characteristics:

- SHAPE (Shot? Grit?);
- HARDNESS (four basic ranges);
- SIZE (as it relates to mass, or impact-power);
- SIZE (as it relates to coverage, or particle-population in the blast-stream).

Once the user has settled on the optimum cast steel abrasive choices that will produce the finish quality required, he can address these important factors of the blast cleaning process that are also affected by his choice of abrasive characteristics:

- Speed of Cleaning (Productivity);
- Equipment Wear & Parts Replacement;
- Abrasive Cost per Unit of Work Processed.

A precautionary note: As long as quality of finish is the #1 priority, attractive as it may be to increase productivity or reduce maintenance costs or get more life out of the steel abrasive, consideration must be given to possible adverse effects on finish! What is best for one factor may not be best for another factor. But, there are many applications where finish requirements can be met with either shot or grit, and/or with different choices of size or abrasive hardness—cost savings opportunities can exist.

This article discusses how abrasive choices made can affect "Speed of Cleaning." Incentive to increase productivity of the cleaning department may be the need to meet customers' "just-in-time" delivery demands with existing equipment, and not having to invest in new blast equipment - or, simply to achieve the tremendous cast savings that come from cleaning an additional 20%, 30%, or more, tons or units per shift.

Before considering changes in abrasive characteristics as a means of increasing speed of cleaning, make sure the blast equipment is performing properly and efficiently with the abrasive now in use. Are these three factors under control? Is the blast-stream on target? (A 10% shift can decrease efficiency by 25% or more.) Is the full-rated capacity of the wheel being thrown? (Abrasive not thrown can't clean or profile.) Is the abrasive work-mix in proper balance? An out-of-balance work-mix can decrease productivity by 50% or more. Obviously, doing things right, with the abrasive now in use, has to be the base against which improvement in speed of cleaning-profiling is measured.

Assuming that the operation is fully on track, what changes in abrasive selection might increase speed of cleaning? SIZE? - Larger or smaller? Thinking "larger" means the user thinks greater impact is needed to break/pulverize the contaminant faster. Going just one size larger means approximately 70% greater impact-power for the original size particles. This will definitely bombard the work much harder, but will create a rougher profile. It also means fewer particles thrown per minute - i.e, less coverage. Thinking "smaller" means the user thinks more coverage is needed. (Going one size smaller will increase the particles thrown per minute, but there will be a significant loss of impact-power in the original-size particles in the work-mix). Trial and error is the only way to determine the net effect of changing size.

Change SHAPE? - Means the user doesn't think change will adversely affect Finish, but may even improve it and, also thinks perhaps switching from shot to grit will provide a cutting action that may increase speed of cleaning. (Standard SAE hardness grit will round up in use, developing a work-mix similar in shape and effect to a shot work-mix. Thus, only by changing to grit of higher HARDNESS will there be a significant change in cutting ability).

Some contaminants, usually relatively thin but tenacious, do respond best to the cutting action of harder grit - but, thick, heavy oxide scale, etc. usually is removed faster by optimizing impact, rather than via cutting action. (It needs a ball-peen hammer effect instead of a chisel or ice-pick effect.) A harder grit is more friable and will break down more rapidly, developing an angular work-mix finer in size, with less over-all impact-power. Both abrasive consumption and maintenance costs will increase vs. standard hardness shot or grit. Yet, the cost savings benefit of cleaning more tons per shift can offset these factors.

The most commonly used measure of blast cleaning-profiling cost control is "COST PER WHEEL HOUR," relating primarily to the cost of abrasive consumption (pounds or dollars per wheel hour). It's quick and easy, but its major shortcoming is that it doesn't reflect the all-important factor of productivity. If, for example, the wheels are operating at less than full-rated amps, obviously the abrasive-use per hour will be low - but this doesn't tell the user that because less abrasive is being thrown, it takes more blast hours to clean the work, and that a lot of re-blast time will also be incurred. Thus, costs will skyrocket - and productivity will be decimated. Pure disaster!

Cost studies have shown that steel abrasive represents only 15%, on average, of the total cost per ton or unit of work blast cleaned-profiled. Taking steps to maximize productivity via increasing the speed of cleaning, attacks the other 85% of total costs!